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ABSTRACT

This paper presents the results of analyses of viewing and listening rates observed in 1974, 1976, and 1977 surveys of student use of Open University broadcasting in conjunction with data regarding transmission times and number of television or radio programs per course. In this analysis, nine different transmission time categories are identified, from very early weekday morning to late night transmission. Data are summarized for all courses included in the three broadcast surveys regarding: transmission time combinations for television broadcasting; number of TV programs in the course; expected and observed viewing rates for all students and for non-dropouts; residual viewing rates, i.e., difference between observed and expected rate, for all students and for non-dropouts. Analyses of these data led to the following main conclusions: (1) the allocation of transmission times, for first or second, or for single transmissions, can considerably affect the viewing/listening rates for the broadcasts; (2) TV viewing rates are to some extent affected by the number of programs in each course; no similar correlation has been observed between listening rate and number of programs for radio broadcasts; (3) most of the variation (80+%) among courses in viewing/listening rates must be attributed to factors other than transmission time variation. (VT)

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# THE EFFECT OF TRANSMISSION TIMES ON STUDENTS' USE OF OU BROADCASTS

by

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## INTRODUCTION

### Background

In the analysis of the data from the first OU Broadcast Survey (Bates 1975) efforts were made to assess the effect of variation in transmission times on students' use of broadcasts. Tony Bates concluded that

> "more important than the time (of transmission) is the use made of broadcasting by the course and whether it is a first or second transmission" (a.a., p.55)

and

> "any (transmission) time appears to be almost as good as any other" (ibid).

The second OU Broadcast Survey (Gallagher 1977) seemed to confirm these results. Margaret Gallagher writes:

> "It was found in 1974 that no particular combination of transmission times appeared to significantly depress overall viewing and listening figures on any course, and that as long as there were repeats any individual time appeared as good as any other. This was still the case in 1976." (a.a., p.63)

There is no reason to doubt Tony Bates' conclusion that most of the variation among courses in viewing and listening rates can be attributed to causes other than differences in transmission times - or rather in combinations of first and second transmission times. But this does not exclude the possibility that differences among courses in transmission time combinations (from now on TX combinations) may contribute significantly to variations in viewing and listening rates. If this is the case, it would be useful for future planning to take this effect of TX combinations into account in comparisons of viewing and listening rates for different courses.

This paper presents the results of analyses of viewing and listening rates observed in the 1974, 1976, and 1977 broadcast surveys in conjunction with data regarding transmission times and number of TV or radio programmes per course.

## Viewing rates for first transmissions and for repeats

When there are two transmissions of a programme, one cannot expect the viewing (or listening) rate for one transmission to be independent of the rate for the other transmission. In particular, the viewing rate for the second transmission will be greatly affected by the proportion of students who have already watched the first transmission. A high viewing rate for the first transmission will tend to lead to a lower rate for the second transmission and vice versa.

One way of eliminating as much as possible of the inter-dependence between second and first transmission viewing (or listening) rates is to express the rate for the second transmission as a percentage of those who did not watch the first transmission. For example, if 40 per cent watched the first transmission (whether or not they then also watched the second), and another 30 per cent watched only the second transmission, that makes the relative viewing rate for the second transmission 30 / (100 - 40) %, i.e. 50 per cent. Plots of these relative viewing rates for second transmissions against the appropriate first transmissions viewing rates for all courses with two TV transmissions in the three broadcast surveys have confirmed that there is virtually no correlation between these two variables, i.e. the relative viewing/listening rate for the second transmission is not dependent on the rate for the first transmission.

## Categories of transmission times

Previous analyses of TX combinations (see mainly Bates 1974) have only identified four categories of transmission time:

early weekday morning;
early weekday evening;
Saturday; and
Sunday

In this analysis nine different transmission time categories are indentified:

VEM: Very early weekday morning (transmission starts before 07.20)

EM: Early weekday morning (transmission starts 07.30)

EPM: Very early weekday evening (transmission starts 17.25 or earlier)

PM: Early weekday evening (transmission starts after 17.30)

ESAT: Early Saturday morning (transmission starts 08.10 or earlier)

SAT: Saturday (any transmission starting 08.30 or later)

ESUN: Early Sunday morning (transmission starts 08.10 or earlier)

SUN: Sunday (any transmission starting 08.30 or later)

LSUN: Late night transmission between Sunday and Monday (usually 00.20 or 00.40; only radio).

Expected rates for each transmission time category

Preliminary analyses of viewing and listening rates indicated that there are considerable differences between faculties in these rates. Since transmission time categories are not evenly distributed among faculties, it is important to try to adjust as far as possible for these differences, which otherwise might tend to mask differences between transmission time categories.

In the present analysis, means have been calculated for all those cells in the TX time type by faculty matrix, for which there are any observations. This analysis has been carried out first for viewing/listening rates at first transmissions, and then for relative rates at second transmissions. Estimates

of overall means for each TX time category have been obtained through a weighting procedure, where the mean for each cell in the TX time category by faculty matrix is given the weight it would have, if TX time categories were distributed evenly among faculties. There are a number of missing values in this analysis, since some of the less frequent TX time categories do not occur within all the six faculties. Mean values for these cells have been estimated, utilizing mean values for surrounding cells in the TX time category by faculty matrix.

The procedure described above resulted in correction coefficients for each TX time category at first transmission ($C_{1TXT}$) and at second transmission ($C_{2TXT}$). Expected viewing/listening rate ($R_e$) for any TX combination can then be calculated through the formula:

$$R_e = \bar{R}_{1TX} + C_{1TXT} + (1 - \bar{R}_{1TX} - C_{1TXT}) \cdot (\bar{R}_{2TX} + C_{2TXT}) \ ;$$

where $\bar{R}_{1TX}$ = grand mean for first transmission viewing/listening rate;

$\bar{R}_{2TX}$ = grand mean for relative viewing/listening rate at second transmission.

All C and R values in this formula are proportions, so $R_e$ has to be multiplied by 100, if a percentage value is desired.

In the case of television viewing rates, the expected rates ($R_e$) have been further adjusted, taking into account the fact that courses with larger number of programmes have higher viewing rates than courses with fewer programmes (even after viewing rates have been adjusted for differences in TX combinations). This gives the final expected viewing rate.

$R'_e = R_e + C_{NPR}$ ; where $R_e$ is calculated according to the formula above, and $C_{NPR}$ = correction coefficient for no of programmes.

The correction coefficients (+2% for 16 programmes or more and - 1% for less than 16) are empirically determined through an analysis of the differences over all courses between the observed viewing rate ($R_o$) and the rate expected on the basis of TX combination alone ($R_e$).

A corresponding analysis of data for listening rates showed no correlation between adjusted listening rate and number of radio programmes in the course. Consequently, number of programmes is not taken into account in the calculation of expected listening rates.

Analysis of residual viewing/listening rates

The residual rates, i.e. differences between expected and observed rates, will vary less than the observed rates, if there is a correlation between TX combination and viewing/listening rate. The variance of the residual rates can, therefore, be used as an indicator of the degree to which viewing/listening rates are determined by variation among courses in TX combinations. Since there is considerable variation between faculties, and since (as will be shown later) the year of survey (1974 or 1976/77) and category of students (undergraduates or post-experience students) also contribute to the variation in viewing/listening rates, an estimate of the effect of TX times can be obtained through comparison between residual rate variance and observed rate variance within cells in the faculty by year of survey and category of students matrix.

A note of caution seems called for regarding the causal interpretation of the correlation between TX combinations and viewing/listening rates. The allocation of time slots has, particularly in recent years, taken into account the success with which courses seemed to have used broadcasts in the past. To some extent, 'poor' time slots may, therefore, be the result rather than the cause of low viewing rates. This certainly obscures the picture somewhat, but there are reasons why it is unlikely that it invalidates the conclusion that 'poor' time slots can cause low viewing/listening rates. Firstly, the principle of giving 'poor' time slots to courses which use TV or radio 'poorly' has never been consistently applied. Secondly, knowledge about the attractiveness of various time slots was scarce before the first broadcast survey in 1974, and a substantial proportion of the data used in my analysis was collected in 1974. Thirdly, even when the allocation principle mentioned above has been applied, it seems mainly to have been a question of ensuring that certain courses got 'prime' time slots, whereas little differentiation was made between 'average' and 'poor' time slots.

The variance within cells for residual rates for a total of 146 viewing rate observations is 79 per cent of the variance within cells for the observed viewing rates. In other words, adjustment for differences between courses in TX combinations and number of programmes per course leads to a reduction in variance of 21 per cent. (Of those 21 per cent, TX combinations account for 18 per cent and variation in number of programmes for 3 per cent). This must be regarded as a statistically and also practically significant reduction in variance.

The variance within cells for residual rates for a total of 157 listening rate observations is 83 per cent of the variance within cells for the observed listening rates. The reduction of variance due to regression on TX combinations is, then, roughly the same in the case of listening rates (17 %) as in the case of viewing rates (18 % see above).

The conclusion from the analysis of residual viewing and listening rates is that differences between courses in broadcast transmission times significantly affect the viewing and listening rates as they have been observed in the 1974, 1976 and 1977 broadcast surveys.

## TV VIEWING RATES

### Expected viewing rates

The weighted average first transmission viewing rate is 44 per cent and the weighted average for the relative viewing rate at second transmission is 27.5 per cent.

The correction coefficients for the different TX time types are as follows (rounded off to two decimal places).

| TX category | $C_{1TXT}$ | $C_{2TXT}$ |
|---|---|---|
| VEM (very early weekd. morn) | -. 08 | -.08 |
| EM (early weekday morning) | -. 07 | -.07 |
| EPM (very early weekd. ev.) | -. 07 | -.02 |
| PM (early weekday evening) | -. 01 | +.03 |
| ESAT (early Sat. morning) | ( 0 )*) | -.02 |
| SAT (Saturday other times) | +. 07 | +.07 |
| ESUN (early Sun. morning) | +.02 | +.01 |
| SUN (Sunday, other times) | +. 07 | +.13 |

*) Coefficient estimated on the basis of only one observation.

The above values have been used for the calculation of expected viewing rates for TX combinations in table 1a. Table 1b shows the number of observations for each TX combination.

Table 1a Expected viewing rates for all students on a course ($R_e$) for all possible TX combinations.

| First TX | Second transmission | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | VEM | EM | EPM | PM | ESAT | SAT | ESUN | SUN |
| VEM | 48 | 49 | 53 | (56) | 53 | (58) | 54 | (62) |
| EM | 49 | 50 | (54) | (56) | 53 | (59) | 55 | (63) |
| EPM | 48 | 49 | 53 | 56 | 53 | (58) | 54 | (62) |
| PM | (54) | (55) | 58 | 61 | (58) | (63) | (59) | (66) |
| ESAT | ? | (55) | ? | ? | ? | ? | ? | ? |
| SAT | (59) | (60) | (62) | (65) | 62 | 67 | 64 | 70 |
| ESUN | 56 | 57 | 60 | (62) | 60 | 64 | 61 | 68 |
| SUN | (61) | (61) | (64) | (66) | 64 | 68 | 65 | (71) |

Note 1 Encircled figures are expected viewing rates for TX combinations actually in use.

Note 2 ? indicates that expected value has not been calculated due to lack of observations

Note 3 For corresponding values for non-dropouts, add 6 p.c. units to each of the values in the table.

* * *

Table 1b Number of observations of viewing rate for each TX combination actually in use.

| First TX | Second transmission | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | VEM | EM | EPM | PM | ESAT | SAT | ESUN | SUN | SUN |
| VEM | - | - | - | 14 | - | 9 | - | 8 | 31 |
| EM | - | - | 1 | 4 | - | 4 | - | 1 | 10 |
| EPM | - | - | - | - | - | 3 | - | 3 | 6 |
| PM | 3 | 4 | - | - | 3 | 3 | 3 | 2 | 18 |
| ESAT | - | 1 | - | - | - | - | - | - | 1 |
| SAT | 14 | 4 | 12 | 4 | - | - | - | - | 34 |
| ESUN | - | - | - | 6 | - | - | - | - | 6 |
| SUN | 15 | 5 | 10 | 9 | - | - | - | 1 | 40 |
| Sum | 32 | 14 | 23 | 37 | 3 | 19 | 3 | 15 | 146 |

The values in table 1a represent the best estimates of what viewing rate the different TX combinations should, on the average, be expected to entail. For all students on a course, the reliability of the estimates depends on the number of observations for each TX time category. It should be noted that the estimate for a give TX combination is based not only on the observations for that particular combination(which may be very few), but on all observations that have one TX time category in common with the combination in question. For example, the combination EM-EPM is observed in only one case, but the estimate for this combination, 54 per cent, is based also on 9 other observations where first transmission is of type EM and on 22 other observations where the second transmission is of type EPM (cf.table 1b).

The expected viewing rates in table 1a are calculated on the basis of observed viewing rates, which all have their error margins, due mainly to the effects of random sampling of students for the broadcast surveys. The error margins of the observed rates are, of course, reflected in the expected rates, so that the greater the standard errors of a set of observed rates, the greater the standard error of the corresponding expected rate, and vice versa. The expected rate for a TX combination is the sum of two components: rate for first TX and relative rate for second TX. This tends to increase the standard error (of the composite expected rate compared to the non-composite observed rate). On the other hand, the expected rates for first and second TX times are each based on a number of observations, something which tends to make the standard error smaller. The row sums and column sums in table 1b indicate how many observations there have been for each type of first TX (row sums) and of second TX (column sums). The net effect of calculating means for first and second TX and then adding two means to a composite is a decrease in standard error, i.e. the standard errors of the values in table 1a are lower than the average standard error for a single observed viewing rate (about $\pm 5$ percent). The only exception is the TX combination ESAT-EM, where the standard error is approximately the same as for a single observation of viewing rate. Otherwise the standard error varies from about $\pm 3$ percentage

points for TX combinations involving the least frequent time slots (e.g. ESAT and ESUN), to about ±1.2 percentage points for the most common combinations of time slots.

The most interesting values in table 1a are those that are encircled, i.e. those representing actually used TX combinations. The other values should be regarded as the best available estimate of the average viewing rate that could be expected, if these TX combinations were used.

The effect of variation in TX combinations is, as can be seen in table 1a, considerable. Values for TX combinations that have actually been used range from 54 percent (EM-EPM & PM-VEM) to 71 per cent (SUN-SUN; a combination of two 'prime' time slots which seems to have been used accidentally in one case). Even if we disregard this rather extreme case, there is still a difference of 12 percentage points between the highest (66%) and the lowest (54%) viewing rate that can be expected for an existing TX combination.

The percentage values in table 1a are, on the whole, very similar for the upper and lower triangular matrices. That is, the expected viewing rate for a given combination (e.g. VEM-SAT) is approximately the same as for the reverse (i.e. SAT-VEM). This suggests that, once it has been decided which two transmission slot should be used for a course, it makes little difference which of the two slots is used for the first transmission. There seems to be one exception to this rule, though, in that the very early evening time slots (EPM) give considerably lower viewing rate than the later evening slots (PM), when they are used for first transmission (cf. combinations EPM-SAT and PM-SAT), whereas EPM slots used for second transmission give almost as high viewing rates as PM slots (cf. SAT-EPM and SAT-PM).

It should also be noted that there is very little difference in viewing rates between very early weekday morning time slots (VEM) and early weekday morning time slots (EM). These two time slot categories can, therefore, for the purpose of broadcast time allocation, be treated as equivalent (as was the case in earlier analyses).

Differences between expected and observed viewing rates

Appendix 1 summarizes data for all courses included in the three broadcast surveys regarding:

TX combinations for TV broadcasting;

Number of TV programmes in the course;
Expected ($R'_e$) and observed ($R_o$) viewing rates for all students and for non-dropouts (except for 1974 when data for non-dropouts were not obtained);

Residual viewing rates (dR, i.e. difference between observed and expected rate) for all students and for non-dropouts (except for 1974 courses).

It should be noted that observed viewing rate here means viewing rate for broadcast., excluding any viewing of recorded programmes.

At the bottom of the list for each faculty are listed those courses, if any, which had only a single transmission of the TV programmes. It should be remembered that the expected viewing rates for various TX time slots were calculated on the basis of data for courses with repeats. Expected viewing rates for courses without repeats should, therefore, be treated with special caution. A discussion of the effect of single transmissions will follow later in this report.

The question of the accuracy of expected viewing rates has already been discussed (p. 9 ). The order of magnitude of the standard error of expected viewing rates was indicated, but no attempt was made to calculate exact standard errors. Since the residual rates in appendix 1 depend both on the expected and the observed rates, the standard errors of a residual must always be larger than the standard error of the observed rate, which, in turn, is nearly always larger than the standard error of the expected rate. That is, the reliability of the residual, which is a difference (i.e. a composite measure), is lower than that of either of the two single measures determining it. Without attempting to calculate exact error margins for these residuals one can propose certain rules of thumb for their interpretation:

-- When the residual rate if within the interval +5 to - 5 percentage points, it should for all practical purposes be regarded as no residual, i.e. the observed rate is neither more not less than what can be expected

-- When individual courses are compared, no importance should be attached to differences in residual rates which are smaller than 10 percentage points.

-- When the mean residual rates for groups of courses (e.g. within faculties or within levels) are compared, NO IMPORTANCE should be attached to mean differences SMALLER than 5 PERCENTAGE POINTS if there are LESS than 50 COURSES in each group

and

-- NO IMPORTANCE should be attached to mean differences SMALLER than 3 PERCENTAGE POINTS if there are MORE than 50 COURSES in each group.

As has been mentioned earlier, the variation among courses in TX combinations and in number of TV programmes per course account for about 20 percent of the variance within groups of courses in TV viewing rates. This confirms (as was expected) Tony Bates' conclusion that factors other than transmission time account for most of the variation in viewing rates. No attempt will be made here to explain all the variation in residual viewing rates, i.e. the variation not explained by differences in TX combinations and number of programmes. It can be assumed that a substantial proportion of that variation is course-specific, which means that it can only be explained as a result of factors or circumstances unique to each individual course. There is, however, a certain amount of variance in the residual viewing rates which is not course-specific, and an attempt has been made to analyze this variance.

I have looked at three sources of variation in viewing rate residuals (dR in Appendix 1). These are

- Faculty to which the course belongs;
- year of survey, 1974 or 1976-77 (the two later years have been combined in order to avoid too many sub-groups in the analysis); and
- category of students surveyed: undergraduates (UG) or post-experience students (PE).

Since post-experience students were not included in the first survey (1974), it is not possible to have a complete 'three-dimensional' design: faculty x year of survey x category of student. Instead I have analyzed a two-dimensional design: six faculties x three year and category groups, namely 1974 undergraduates, 1976-77 undergraduates, and 1976-77 post-experience students. For this analysis viewing rates for 'all students' in each course have been used, since values for 'non dropouts' are not available for the 1979 courses. The mean residuals for the cells in this six x three ANOVA design, and the row and column means are shown in table 2a. (The method of ANOVA used is described in Appendix 3. Table 2b summarizes the ANOVA results.

Table 2 Viewing rates for 'all students' for courses with TV repeats: Analysis of mean residuals ($dR = R_o - R'_e$) for faculties, year of survey and category of students.

(a) Cell means

| Year | Student category | | Faculty A | D | E | M | S | T | All facs. |
|---|---|---|---|---|---|---|---|---|---|
| 1974 | Undergraduates | M | +4 | -2 | +1 | -9 | +11 | +3 | +2 |
| | | (n) | (11) | (13) | (8) | (9) | (11) | (6) | (58) |
| 1976-77 | Undergraduates | M | -1 | -7 | -6 | -7 | +4 | -4 | -3 |
| | | (n) | (14) | (16) | (7) | (5) | (13) | (12) | (67) |
| 1976-77 | Post-exp-studs. | M | +3 | 0 | +4 | +4 | +5 | +8 | +4 |
| | | (n) | (4) | (2) | (4) | (2) | (2) | (7) | (21) |
| 1974-77 | UG + PE | M | +2 | -4 | -2 | -6 | +7 | 0 | 0 |
| | | (n) | (29) | (31) | (19) | (16) | (26) | (25) | (146) |

Note: Mean values in the table are percentage points. n-values, in brackets, show the numbers of courses for which viewing rates have been observed.

(b) ANOVA results

| Source of variation | df | $S^2$ | F |
|---|---|---|---|
| Faculties (F) | 5 | 475.0 | 14.1* |
| Year and student categ (Y) | 2 | 591.0 | 17.5* |
| Interaction: = F x Y | 10 | 65.8 | 1.9 |
| Error (within groups) | 126 | 33.8 | - |

* significant at the 0.1% level

Both the differences between faculties and the differences between years of survey (1974 versus 1976-77) and student categories (undergraduates versus post-experience students) are highly significant. The 1976-77 surveys covered, to a great extent, other courses than those covered by the 1974 survey. It is, therefore, difficult to know whether the higher viewing rate residuals 1974 than 1976-77 is a result of this difference in the selection of courses - or if there has been a drop in TV viewing rates from 1974 to 1976-77. Since the 1976-77 surveys mainly covered new courses, it can at least be concluded that courses which started 1975 or later tend to have lower viewing rates than courses which started 1974 or earlier. This can be due partly to the fact that new courses are often higher level courses with older students, who tend to watch TV less than the younger students.

The interaction between faculties, on the one hand, and year of survey and student category, on the other, is not significant. This means that the differences between faculties in terms of mean residual viewing rate are relatively stable from year to year. The Science faculty, for example, has a mean residual well above average both in 1974 and in 1976-77. The lack of interaction also means that the difference between undergraduates and post-experience students is of the same order of magnitude in all the six faculties. In other words, whatever factors cause differences between faculties in viewing rates, these factors operate in much the same way within both student categories and during the whole period 1974-1977.

The mean residuals in table 2 indicates to what extent observed viewing rates are above (+ sign) or below (- sign) the expected values. The row means, across all faculties, show that post-experience students (PE) have about 7 per cent higher viewing rates than undergraduates (UG). Undergraduates 1976-77 has, on the average, 5 percentage points lower viewing rates than undergraduates 1974. The differences between faculties are also considerable. Science faculty courses have, on the average, 13 per cent higher viewing rates than Mathematics faculty courses, and 11 per cent higher viewing rates than Social Science faculty courses. The mean differences between Arts and Mathematics

(8 per cent), Science and Education (9 per cent) and Science and Technology (7 per cent) are all of the same order of magnitude. If all the other faculties could achieve the same average viewing rate as the Science faculty, this would lead to an increase in the mean viewing rate for the whole OU from the present 60 per cent up to 67 per cent.

Viewing rates for non-dropouts

Viewing rates for non-dropouts in each course are available from the 1976 and 1977 broadcast surveys. The mean residual viewing rates for undergraduates and for post-experience students within each of the six faculties are given in table 3. There is approximately the same amount of variation between groups for the non-dropouts as for all students (cf. table 2). The difference between undergraduates and post-experience students is exactly the same (7 per cent), but differences between faculties are smaller compared to those for all students in table 2. The mean values (in table 3) for 1976-77 undergraduates and post-experience students taken together show that viewing rate is considerably higher for the Science faculty than for any of the other faculties. The mean viewing rate for the Science faculty is 9 per cent higher than the mean rate for the five other faculties taken together.

Table 3 Viewing rates for 'non-dropouts' for courses with TV repeats: Analysis of mean residuals ($dR = R_o - R'_e$) for faculties and for undergraduates and post-experience students (1976-77).

(a) Cell means

| Year | Student category | | Faculty A | D | E | M | S | T | All facs |
|---|---|---|---|---|---|---|---|---|---|
| 1976-77 | Undergraduates | M | -3 | -7 | -5 | -5 | +5 | -3 | -3 |
| | | (n) | (14) | (16) | (7) | (5) | (13) | (12) | (67) |
| 1976-77 | Post-exp-studs. | M | +1 | -1 | +3 | +4 | +7 | +8 | +4 |
| | | (n) | (4) | (2) | (4) | (2) | (2) | (7) | (21) |
| 1976-77 | UG + PE | M | -2 | -6 | -4 | -3 | +6 | -1 | -1 |
| | | (n) | (18) | (18) | (11) | (7) | (15) | (19) | (88) |

Note: Mean values in the table are percentage points. n-values, in brackets show numbers of courses for which viewing rates have been observed. Viewing rates for non-dropouts were not obtained in the 1974 survey.

(b) ANOVA results

| Source of variation | df | $s^2$ | F |
|---|---|---|---|
| Faculties (F) | 5 | 223.1 | 5.6* |
| Category of students (C) | 1 | 656.6 | 16.4** |
| Interaction: F X C | 5 | 34.2 | 0.9 |
| Error (within groups) | 74 | 40.0 | -- |

* significant at 1% level

** " " 0.1% level

The analysis of variance results in table 3 show that differences between faculties as well as between student categories are significant. These results also show that there is no significant interaction between faculty and category of students, which means that the difference in viewing rate residual for post-experience students and undergraduates is about the same for all the six faculties.

Viewing rates for courses with single transmissions

Only nine observations of viewing rates for courses with single transmissions are available in the data analyzed here: two observations in the Arts faculty (A303 and A401, both 1977); three in the Social Sciences faculty (D222, D301, and D333, all 1977); and four in the Mathematics faculty (M202 both 1976 and 1977, M201 and PM951 in 1977 only). Eight of these observations are for undergraduates, and only one for post-experience students (PM951 in 1977).

The average residual viewing rate (i.e. difference between observed and and expected rate) for the eight undergraduate courses without TV repeats is -11 per cent. This means that the viewing rates for these courses are far below the viewing rates that are normally obtained for first transmissions using the time slots in question. It is difficult to know what is cause and what is effect here, since courses may have been deprived of their TV repeats because TV broadcasts were not used very much even while there were repeats. It may be interesting, therefore, to compare viewing rate residuals for these courses when they had TV repeats with the residuals when they had only single transmissions. Those figures are summarized in table 4.

Table 4 Viewing rate residuals with and without TV repeats.

| Course | Two transmissions | | | Single transmissions | | |
|---|---|---|---|---|---|---|
| | Year | $R_o$ | dR | Year | $R_o$ | dR |
| A303 | 76 | 55 | -5 | 77 | 34 | -15 |
| A401 | 76 | 48 | -12 | 77 | 41 | -8 |
| D222 | 74 | 56 | -4 | 77 | 30 | -19 |
| D301 | 76 | 51 | -7 | 77 | 36 | -13 |
| D333 | 76 | 42 | -13 | 77 | 42 | -7 |
| M202 | 74 | 55 | -5 | 76 | 51 | -1 |
| | | | | 77 | 47 | -5 |
| M201 | 74 | 58 | -6 | 77 | 35 | -17 |
| PM951 | 76 | 71 | +10 | 77 | 55 | +5 |
| Mean | - | 54 | -5 | - | 41 | -9 |

All eight courses, except one, already had a negative residual viewing rate before they lost their repeats. The average viewing rate was 54 per cent, and the average residual -5. With single transmissions these courses had an average viewing rate of 41 per cent, and an average residual of -9 per cent. This seems to suggest that the loss of TV repeats leads to a larger drop in viewing rate than can be explained by the lack of a second transmission alone. Judging by the expected rates for different time slots, the loss of repeats for these courses should have led to a 9 per cent drop in viewing rates, but the observed drop is 13 per cent (from 54 to 41%).

The tentative conclusion is, then, that loss of TV repeats can be expected to lead to a drop in viewing rate corresponding to the rate the second transmission would have attracted, plus a further drop of the order of magnitude 1 - 5 per cent. It is difficult to establish what causes this 'extra' drop in viewing rate, but one possibility is that some students may perceive the TV broadcasts for a particular course as less important when they realize that the TV repeats have been eliminated.

Changes in viewing rates from 1974 to 1976

Nineteen courses, representing all six faculties, were included in both the 1974 and the 1976 survey. TV viewing rates for these courses can give an indication of changes in average viewing rate from 1974 to 1976. The table below summarizes viewing rate data for these 19 courses ($R_o$ = observed viewing rate, and dR = residual rate).

| Course | 1974 $R_o$ | 1974 dR | 1976 $R_o$ | 1976 dR | Diff 1974-1976 in $R_o$ | Diff 1974-1976 in dR |
|---|---|---|---|---|---|---|
| A291 | 66 | +9 | 59 | +4 | -7 | -5 |
| A301 | 67 | +7 | 54 | -7 | -13 | -14 |
| A302 | 64 | +4 | 60 | -1 | -4 | - 5 |
| A303 | 58 | 0 | 55 | -5 | -3 | - 5 |
| A304 | 73 | +13 | 68 | +7 | -5 | - 6 |
| A401 | 57 | 0 | 48 | -12 | -9 | -12 |
| D301 | 58 | +1 | 51 | 7 | -7 | - 8 |
| D?31 | 58 | -7 | 37 | -18 | -21 | -11 |
| D342 | 52 | -8 | 51 | -10 | - 1 | - 2 |
| DT352 | 67 | +7 | 61 | 0 | - 6 | - 7 |
| E341 | 60 | +2 | 50 | -10 | -10 | -12 |
| M100 | 63 | -5 | 62 | 0 | - 1 | + 5 |
| S100 | 77 | +10 | 77 | +10 | 0 | 0 |
| ST285 | 66 | + 2 | 57 | - 4 | - 9 | - 6 |
| SDT286 | 66 | +10 | 60 | - 2 | - 6 | -12 |
| S323 | 77 | +13 | 64 | + 3 | -13 | -10 |
| T241 | 59 | - 8 | 55 | - 8 | - 4 | 0 |
| T242 | 56 | + 1 | 52 | - 8 | - 4 | - 9 |
| TS282 | 62 | - 5 | 53 | - 5 | - 9 | 0 |
| Mean | 63.5 | +2.2 | 56.5 | -3.8 | -7.0 | -6.0 |

Changes in viewing rates contd/.....

The average difference is 7 percentage points between observed viewing rate 1974 and observed rate 1976. The corresponding difference in residual viewing rates is 6 percentage points. It is worth noting that all 19 differences in $R_o$ from 1974 to 1976 are either negative or 0, and that only 1 out of 19 differences in dR is positive. These data give, then, very strong support for the conclusion that there has been a drop in television viewing rates from 1974 to 1976.

## RADIO LISTENING RATES

### Single TX compared to first TX

The data for radio listening rates contain observations for 33 courses with single transmissions 14 on Sundays (SUN) and 19 on weekday evenings (PM). Courses with single transmissions on Sundays cannot be compared with courses with first TX on Sundays, for the simple reason that no such courses exist. Such a comparison is, however, possible in the case of weekday evening TXs (PM). 59 observations representing four faculties (A, D, M and S) have been analyzed. Cell means and cell frequencies in a four faculties by two TX patterns design are shown in table 5a, and the results of an ANOVA for these data are given in table 5b

Table 5 Listening rates for single TX and first TX at a given category of time slot (PM)

(a) Cell means (percentages) in a Faculty x TX design

| | | Faculty | | | | |
|---|---|---|---|---|---|---|
| TX | | A | D | M | S | ALL |
| First TX | M | 40 | 33 | 23 | 31 | 32 |
| | (n) | (7) | (14) | (8) | (11) | (40) |
| Single TX | M | 39 | 36 | 18 | 35 | 33 |
| | (n) | (9) | (2) | (3) | (5) | (19) |
| Both TX | M | 40 | 34 | 21 | 33 | 33 |
| | (n) | (16) | (16) | (11) | (16) | (59) |

(b) ANOVA results

| Source of variation | df | $s^2$ | F |
|---|---|---|---|
| 1st vs. single TX (T) | 1 | 9.0 | 0.3 |
| Faculties (F) | 3 | 738.3 | 27.9* |
| Interaction: T x F | 3 | 49.7 | 1.9 |
| Error (within cells) | 52 | 26.4 | -- |

* signif. at 0.1% level

The mean listening rate at first PM transmissions is about 32 per cent, and the mean for single PM transmissions is about 33 per cent. This difference (1%) is not significant (neither statistically nor, in my opinion, practically), whereas the differences between faculties are highly significant, as we have come to expect from previous analyses.

The conclusion that can be drawn from this analysis is, then, that listening rate for a single transmission at a given time can be expected to be very similar to the listening rate for a first transmission at that time. In view of this result, I decided to treat observations of single TX rates as equivalent to observations of first TX rates in the process of estimating expected listening rates for various TX time slots and TX combinations.

Expected listening rates

The weighted average for first transmission listening rate is 0.31 (31%) and the weighted average for the relative listening rate at second transmission is 0.175 (17.5%).

The correction coefficients for the different TX time types are as follows:

| TX category | $C_{1TXT}$ | $C_{2TXT}$ |
|---|---|---|
| VEM (very early weekday morning) | -.070 | -.095 |
| PM (early weekday evening) | +.020[1)] | +.045 |
| ESAT (early Saturday morning) | -.020 | -.035 |
| SAT (Saturday, other times) | 0 | -.005 |
| ESUN (early Sunday morning) | -.080 | -.085 |
| SUN (Sunday late morn. and aftern.) | +.090[2)] | +.070 |
| LSUN (night betw. Sunday and Monday) | -- | -.070 |

1) Est. based on both first TX and single TX observations.

2) Est. based on single TX observations only.

Expected listening rates for TX combinations have been computed, using the above values in the formula presented in the Introduction (p. 4 ). The expected rates are shown in table 6a, and the number of observations for each TX combination are shown in table 6b.

Table 6a Expected listening rates for 'all students' on a course ($R_e$) for all TX combinations.

| First TX | Second transmission | | | | | | | No 2nd TX |
|---|---|---|---|---|---|---|---|---|
| | VEM | PM | ESAT | SAT | ESUN | SUN | LSUN | |
| VEM | 29 | (40) | 34 | (36) | 30 | (42) | 31 | 23 |
| PM | (37) | 47 | (41) | (43) | (38) | (48) | 39 | (32) |
| ESAT | 34 | (43) | 38 | 40 | (34) | 45 | 35 | 28 |
| SAT | (36) | (45) | 40 | 42 | 36 | 47 | (37) | 30 |
| ESUN | 28 | (39) | 33 | 35 | 29 | (41) | 30 | 22 |
| SUN | 46 | 52 | 47 | 49 | 44 | 54 | 45 | (39) |

Note 1: Encircled values are expected viewing rates for TX combinations actually in use.

Note 2: For corresponding values for non-dropouts, add 5 p.c. points to each of the values in the table.

* * *

Table 6b Number of observations of listening rate for each TX combination actually in use.

| First TX | Second transmission | | | | | | | No 2nd TX | Sum |
|---|---|---|---|---|---|---|---|---|---|
| | VEM | PM | ESAT | SAT | ESUN | SUN | LSUN | | |
| VEM | - | 9 | - | 4 | - | 7 | - | - | 20 |
| PM | 5 | - | 7 | 36 | 7 | 1 | - | 19 | 75 |
| ESAT | - | 11 | - | - | 2 | - | - | - | 13 |
| SAT | 7 | 8 | - | - | - | - | 4 | - | 19 |
| ESUN | - | 15 | - | - | - | 1 | - | - | 16 |
| SUN | - | - | - | - | - | - | - | 14 | 14 |
| Sum | 12 | 43 | 7 | 40 | 9 | 9 | 4 | 33 | 157 |

The encircled values in table 6a represent TX combinations actually used, and are therefore of particular interest here. The other values (not encircled) represent the best possible estimates of the average listening rates that could be expected, if these TX combinations were used. What has been said earlier (p.9f above) about the error margins of expected viewing rates applies also to the expected listening rates. Since the number of observations per TX category is

higher for listening than for viewing (cf. table 1b), the standard errors for listening rates are, on the average, somewhat smaller than the standard errors for viewing rates.

The effect of variation in TX combinations on listening rate is, as table 6a shows, considerable. Values for TX combinations actually used range from 32 to 48 per cent, which incidentally, is the same variation width as for expected viewing rates (cf. table 1a). Even if we disregard the single TX cases, there is a difference of 14 percentage points between the highest (48% for PM-SUN) and the lowest values (34% for ESAT-ESUN). As regards single TX courses, it is worth noting that six of the TX combinations with repeats have lower expected listening rates than a single TX on a Sunday late morning or Sunday afternoon (SUN).

As was the case with the expected viewing rates (see table 1a), the expected listening rates are roughly the same for a given combination of two TX slots, regardless of which slot is used for the first and which for the second TX. The exception to this rule in the case of TV viewing rates was EPM (very early weekday evening), but this TX category is not used for radio.

Differences between expected and observed listening rates

Appendix 2 summarizes data for all courses ( a total of 157) included in the three broadcast surveys regarding:

- TX combination for radio broadcasts;
- Number of radio programmes in the course;
- Expected ($R_e$) and observed ($R_o$) listening rates for all students and for non-dropouts (except for 1974 when non-dropout data were not obtained)
- Residual listening rates (dR, i.e. the difference between the observed and the expected rate) for all students and for non-dropouts (except for 1974 courses).

Listening rate in this context always means listening rate for broadcasts, excluding any listening to recordings of radio programmes. The rules of thumb for the interpretation of residual viewing rates (p.11f above) apply also to residual listening rates, since observed listening rates have, on the whole, the same error margins as observed viewing rates.

The differences between courses in TX combinations account, as has been mentioned earlier, for about 17 per cent of the listening rate variance within groups of courses in the two-dimensional design including six faculties and three combinations of year of survey and category of student (undergraduate or post-experience student). As in the case of TV viewing, factors other than TX time combinations have a much greater influence on the total variation in listening rates. But the amount of variance accounted for by TX combinations is sufficiently large to make it worthwhile to adjust for variation in TX combinations.

The variation in listening rates that can not be attributed to TX time variations is expressed in the listening rate residuals (dR in appendix 2). The listening rate residuals in appendix 2 have been analyzed in the same way as the viewing rate residuals (see p. 12 - 15 ). The first analysis, involving both 1974 and 1976/77 data, has been carried out on the residuals for 'all students', and the results are summarized in table 7.

The ANOVA results in table 7 show two highly significant sources of variation: faculties, and year of survey and student category. The interaction between the two main factors is not significant. In these respects the analysis of listening rates has yielded results very similar to those for viewing rates (see table 2). The listening rate mean residuals in table 7a show, however, a pattern which is different from that observed for viewing rate residuals (table 2).

The difference in listening rate between undergraduates and post-experience students (9 percentage points) is of the same order of magnitude as the corresponding difference in viewing rate (7 percentage points). But there is no difference between 1974 and 1976/77 listening rates which suggests that while TV viewing rates may have dropped a few per cent since 1974, radio listening rates have, on the whole, remained constant.

Differences in listening rates between faculties are as large as the differences in viewing rates: in both cases there is a maximum difference between any two faculties of 13 percentage points. The Arts faculty has listening rates well above average (+5%), and the Mathematics faculty well below average (-8%), whereas the four remaining faculties have residual means within $\pm 2$ per cent from the overall listening rate, which is approximately 40 per cent.

Table 7 Listening rates for 'all students': Analysis of Mean residuals ($dR = R_o - R_e$) for faculties, year of survey and category of students.

(a) Cell means and frequencies

| Year | Student category | | Faculty A | D | E | M | S | T | All facs. |
|---|---|---|---|---|---|---|---|---|---|
| 1974 | Undergraduates | M | +1 | 0 | 0 | -11 | -1 | -1 | -1 |
| | | (n) | (11) | (13) | (8) | (9) | (11) | (6) | (58) |
| 1976-77 | Undergraduates | M | +7 | 0 | -2 | -10 | -3 | -4 | -1 |
| | | (n) | (17) | (19) | (9) | (8) | (12) | (12) | (77) |
| 1976-77 | Post-exp. stud. | M | +10 | +12 | +8 | +5 | 0 | +9 | +8 |
| | | (n) | (4) | (2) | (5) | (3) | (2) | (6) | (22) |
| 1974-77 | All students | M | +5 | +2 | 0 | -8 | -2 | -1 | 0 |
| | | (n) | (32) | (34) | (22) | (20) | (25) | (24) | (157) |

Note: Means are expressed in percentage points, and n-values, in brackets, show the numbers of courses for which listening rates have been observed.

(b) ANOVA results

| Source of variation | df | $s^2$ | F |
|---|---|---|---|
| Faculties (F) | 5 | 505.6 | 13.7* |
| Year of survey and stud. cat. (Y) | 2 | 769.9 | 20.9* |
| Interaction: F x Y | 10 | 71.7 | 1.9 |
| Error (within groups) | 138 | 36.8 | |

* significant at the 0.1% level

Listening rates for non-dropouts

Data for non-dropouts from the 1976 and 1977 surveys have been analyzed and the results are summarized in table 8, which shows listening rate residual means for various groups and corresponding ANOVA results.

The values for non-dropouts are similar to those obtained for all students in the previous analysis (see table 7), both as regards the difference between undergraduates and post-experience students

and the differences between faculties. The fact that the non-dropouts have a 5 per cent higher average listening rate than 'all students' does not, then, seem to affect the differences between groups of courses or groups of students.

Table 8 Listening rates for non-dropouts: Analysis of mean residuals for faculties and categories of students.

(a) Cell means and frequencies

| Year | Student category | | A | D | E | M | S | T | All facs. |
|---|---|---|---|---|---|---|---|---|---|
| 1976/77 | Undergraduates | M | +5 | -1 | -3 | -12 | -4 | -4 | -2 |
| | | (n) | (17) | (19) | (9) | (8) | (12) | (12) | (77) |
| 1976/77 | Post-exp students | M | +11 | +11 | +7 | +4 | -1 | +8 | +8 |
| | | (n) | (4) | (2) | (5) | (3) | (2) | (6) | (22) |
| 1976/77 | UG + PE | M | +7 | +2 | -1 | -8 | -4 | -1 | 0 |
| | | (n) | (21) | (21) | (14) | (11) | (14) | (18) | (99) |

(b) ANOVA results

| Source of variation | df | $S^2$ | F |
|---|---|---|---|
| Faculties (F) | 5 | 417.8 | 6.4* |
| Stud. categories (C) | 1 | 1738.8 | 26.4** |
| Interaction: F x C | 5 | 33.9 | 0.5 |
| Error (within groups) | 86 | 65.8 | - |

* significant at the 1% level

** significant at the 0.1% level

## The effect of single transmissions

The analysis of listening rates has been based on the assumption (supported by certain empirical data; p. 21f) that expected listening rate for a single transmission at a given time is the same as the expected listening rate for a first transmission at the same time. In order to doublecheck the validity of this assumption I have tabulated, in table 9, data for courses which have been surveyed both when they had repeats and when they had only a single transmission.

The values for 'change in $R_o$' in table 9 show that the difference in listening rate between broadcasting with repeats and without repeats can vary considerably from course to course. One course (A291) actually has a higher listening rate in 1976 with one TX than in 1974 with two TXs. The observed change (+2%) is well within the error margin, but it is still noteworthy in view of the fact that the expected change in viewing rate was -11 percentage points! Two courses (D331 and DT352) had 12 percent lower listening rates with single TX (1976) than they had with repeats (1974). The mean change in observed listening rate ($R_o$) for all 17 courses in table 9 is about -6 percentage points. That is, the loss of radio repeats leads, on the average, to a drop in listening rate of 6 percentage points.

The values for 'change in dR' in table 9 give a measure of how the actual drop in listening rate compares to the expected drop. A positive value for 'change in dR' means that the drop in listening rate following loss of repeats has been smaller than expected (or that there has been no drop as in courses A302 and D342 - or even a slight increase as in course A291). A negative value means that the drop in listening rate has been greater than expected.

Variations from course to course in terms of the 'change in dR' are to some extent due to sampling errors, since the rate for two TXs and the rate for single TX are based on different student

Table 9 Comparisons between listening rates with and without repeats.

| Course | Two TXs | | | Single TX | | | Change in | |
|---|---|---|---|---|---|---|---|---|
| | Year | $R_o$ | dR | Year | $R_o$ | dR | $R_o$ 1) | dR 2) |
| A291 | 74 | 41 | -2 | 76 | 43 | +11 | +2 | +13 |
| A301 | 74 | 44 | +1 | 76 | 36 | +4 | -8 | +3 |
| A302 | 74 | 47 | +4 | 76 | 47 | +15 | 0 | +11 |
| A303 | 74 | 38 | -4 | 76 | 34 | +2 | -4 | +6 |
| A304 | 74 | 50 | +8 | 76 | 47 | +15 | -3 | +7 |
| A401 | 74 | 40 | -3 | 76 | 30 | -2 | -10 | +1 |
| D301 | 74 | 48 | +6 | 76 | 39 | 0 | -9 | -6 |
| D331 | 74 | 44 | +1 | 76 | 32 | -7 | -12 | -8 |
| D342 | 74 | 33 | -5 | 76 | 33 | -6 | 0 | -1 |
| DT352 | 74 | 53 | +10 | 76 | 41 | +2 | -12 | -8 |
| D222 | 74 | 37 | -6 | 77 | 31 | -1 | -6 | +5 |
| M201 | 74 | 27 | -16 | 77 | 19 | -13 | -8 | +3 |
| M202 | 76 | 27 | -10 | 77 | 20 | -12 | -7 | -2 |
| S321 | 74 | 45 | +2 | 76 | 37 | +5 | -8 | +3 |
| S323 | 74 | 39 | -4 | 76 | 34 | +2 | -5 | +6 |
| ST285 | 74 | 36 | -7 | 76 | 31 | -1 | -5 | +6 |
| T242 | 74 | 35 | -3 | 76 | 33 | -6 | -2 | -3 |
| Mean | - | 40.2 | -1.6 | — | 34.5 | +0.5 | -5.7 | +2.1 |

1) I.e. $R_o$ for single TX - $R_o$ for two TXs.

2) I.e. dR for single TX - dR for two TXs.

samples. The mean 'change in dR' for all the 17 courses in table 9 should, however, give a good estimate of the actual effect of loss of radio repeats, as compared to the expected effect. This mean value is +2 percentage points. This means that the drop in listening rate following loss of radio repeats can be expected to be only slightly smaller than the drop that can be predicted purely on the basis of expected listening rates for various time slots.

It is worth noting here that the listening rate of these 17 courses before they lost their repeats were, on the whole, close to the expected rates. That is, there is nothing to suggest that these courses, as a group, had used radio less successfully than the average OU course.

The observed overall drop in listening rates when repeats were withdrawn was 6 percentage points, whereas the expected overall drop was 8 percentage points (based on estimates of listening at second transmissions). The conclusion is, then that it is reasonable to assume that the 'listening rate potential' of a single transmission is approximately the same as the 'listening rate potential' of a first transmission at the same time.

Summary of main conclusions

The analyses of the effects of transmission times on students' use of broadcasts presented in this report have led to the following main conclusions:

(1) The allocation of transmission times, for first or second, or for single transmissions, can considerably affect the viewing/listening rates for the broadcasts in an OU course.

(2) TV viewing rates are to some extent affected by the number of programmes in each course. Courses with 16 programmes or more have an average viewing rate which is 3 percentage points higher than that for courses with less than 16 programmes (normally 8 - 12 programmes).
No similar correlation between listening rate and number of programmes has been observed for the radio broadcasts.

(3) Although the effects of transmission time combinations are considerable, most of the variation (80+ %) among courses in viewing/listening rates must be attributed to factors other than transmissions time variation.

(4) A single transmission of a radio programme at a given time can, on the average, be expected to attract at least the same number of listeners as a first transmission of the same programme on that time. In the case of TV the single transmission tends to attract somewhat fewer viewers than the corresponding first transmission.

(5) An assessment of how successfully different courses use broadcasts will be more accurate, if the observed viewing/listening rates are adjusted for differences between the courses as regards the 'attractiveness' of the transmission times allocated to them.

Concerning the effects of factors other than transmission times and the number of programmes in a course, the following conclusions can be drawn:

(6) The differences between faculties in viewing/listening rates are considerable, even after the rates have been adjusted for differences between courses in TX combinations.
The mean TV viewing rate is well above average in the Science faculty, average or close to the average in the Arts, Educational Studies and Technology faculties, and below average in the Social Sciences and Mathematics faculty. The mean radio listening rate is well above average in the Arts faculty, average or close to the average in the Social Sciences, Educational Studies, Science and Technology faculties, and well below average in the Mathematics faculty.

(7) Courses surveyed in 1974 have TV viewing rates which are, on the average, 5 percentage points higher than courses surveyed in 1976/77, whereas radio listening rates were, on the average, the same for the 1974 as for the 1976/77 courses. A separate analysis of 19 courses surveyed both 1974 and 1976 supports strongly the conclusion that there has been a drop in viewing during that period of about 6 percentage points.

(8) Both TV viewing rates and radio listening rates are considerably higher, given the same TX times, for post-experience students than for undergraduates. The average difference is 7 percentage points for viewing rates and 9 percentage points for listening rates.

(9) TV viewing rates are, on the average, 6 percentage points higher for the non-dropouts in a course than for all students in that course, and radio listening rates are 5 percentage points higher for the non-dropouts than for all students in the course.

Recommendations

(1) The main general recommendation I wish to make following this study is that any attempt to assess viewing/listening rates for courses or groups of courses should take into account not only the observed rates but also the differences between observed rates and the best available estimates of expected rates, given the transmission time slots allocated to each course and - in the case of TV - the frequency of broadcasts during the course.

(2) In the allocation of time slots for transmission to new courses, and in re-allocation of time slots to old courses, the likely effect of each transmission time combination should be taken into account. The most likely effect of a single transmission instead of a combination of first transmission and repeat should also be estimated in each individual case, and taken into account in the allocation of transmission times.

(3) A complete survey of students' use of OU broadcasts (involving all courses) should be carried out in the near future (e.g. 1979) with the aim - among others - of providing more accurate and up to date estimates of the effect on viewing/listening rates of various transmission time slots and combinations of time slots.

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ARTS FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R'_e$ | All students $R_o$ | All students dR | Non-dropouts $R'_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | A100 | PM-SUN | 36 | 68 | 70 | +2 | - | - | - |
| | | A201 | PM-ESAT | 18 | 60 | 61 | +1 | - | - | - |
| | | A202 | PM-ESAT | 17 | 60 | 61 | +1 | - | - | - |
| | | A291 | EPM-SAT | 8 | 57 | 66 | +9 | - | - | - |
| | | AMST283 | PM-ESUN | 11 | 58 | 61 | +3 | - | - | - |
| | | AST281 | PM-ESUN | 11 | 58 | 65 | +7 | - | - | - |
| | | A301 | VEM-SAT | 16 | 60 | 67 | +7 | - | - | - |
| | | A302 | VEM-SAT | 16 | 60 | 64 | +4 | - | - | - |
| | | A303 | PM-ESUN | 11 | 58 | 58 | 0 | - | - | - |
| | | A304 | EPM-SAT | 16 | 60 | 73 | +13 | - | - | - |
| | | A401 | VEM-SAT | 11 | 57 | 57 | 0 | - | - | - |
| 76 | UG | A291 | EM-PM | 8 | 55 | 59 | +4 | 61 | 65 | +4 |
| | | A301 | SAT-VEM | 16 | 61 | 54 | -7 | 67 | 54 | -13 |
| | | A302 | SAT-VEM | 16 | 61 | 60 | -1 | 67 | 61 | -6 |
| | | A303 | SUN-VEM | 11 | 60 | 55 | -5 | 66 | 60 | -6 |
| | | A304 | SAT-VEM | 17 | 61 | 68 | +7 | 67 | 72 | +5 |
| | | A305 | EM-PM | 24 | 58 | 64 | +6 | 64 | 68 | +4 |
| | | A306 | SAT-VEM | 16 | 61 | 59 | -2 | 67 | 63 | -4 |
| | | A321 | PM-EM | 11 | 54 | 34 | -20 | 60 | 38 | -22 |
| | | A351 | PM-EM | 11 | 54 | 64 | +10 | 60 | 69 | +9 |
| | | A401 | SUN-VEM | 10 | 60 | 48 | -12 | 66 | 51 | -15 |
| | | AM289 | SUN-EPM | 11 | 63 | 58 | -5 | 69 | 62 | -7 |
| 76 | PE | A301 | SAT-VEM | 16 | 61 | 61 | 0 | 67 | 67 | 0 |
| | | PA981 | PM-VEM | 4 | 53 | 63 | +10 | 59 | 67 | +8 |
| 77 | UG | A241 | SUN-VEM | 8 | 60 | 65 | +5 | 66 | 70 | +4 |
| | | A307 | SUN-VEM | 16 | 63 | 71 | +8 | 69 | 73 | +6 |
| | | A322 | EM-PM | 8 | 55 | 52 | -3 | 61 | 59 | -2 |
| 77 | PE | AM289 | VEM-SUN | 11 | 61 | 60 | -1 | 67 | 65 | -2 |
| | | AMST283 | EPM-SUN | 11 | 61 | 62 | +1 | 67 | 64 | -3 |
| Single TX courses: | | | | | | | | | | |
| 77 | UG | A303 | SAT only | 11 | 49 | 34 | -15 | 55 | 36 | -19 |
| | | A401 | SAT only | 11 | 49 | 41 | -8 | 55 | 44 | -11 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

SOCIAL SCIENCES FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R'_e$ | All students $R_o$ | All students dR | Non-dropouts $R'_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | D100 | SAT-PM | 37 | 67 | 66 | -1 | - | - | - |
| | | D203 | SUN-PM | 18 | 68 | 55 | -13 | - | - | - |
| | | D222 | SUN-VEM | 8 | 60 | 56 | -4 | - | - | - |
| | | D231 | SUN-PM | 8 | 65 | 61 | -4 | - | - | - |
| | | D281 | ESUN-PM | 9 | 61 | 59 | -2 | - | - | - |
| | | D282 | SUN-VEM | 8 | 60 | 55 | -5 | - | - | - |
| | | D283 | ESUN-PM | 9 | 61 | 56 | -5 | - | - | - |
| | | DS261 | VEM-SAT | 11 | 57 | 63 | +6 | - | - | - |
| | | DT201 | ESUN-PM | 18 | 64 | 66 | +2 | - | - | - |
| | | D301 | VEM-SAT | 11 | 57 | 58 | +1 | - | - | - |
| | | D331 | SUN-PM | 8 | 65 | 58 | -7 | - | - | - |
| | | D342 | SUN-VEM | 8 | 60 | 52 | -8 | - | - | - |
| | | DT352 | SUN-VEM | 8 | 60 | 67 | +7 | - | - | - |
| 76 | UG | D101 | ESUN-PM | 31 | 64 | 64 | 0 | 70 | 67 | -3 |
| | | D281 | ESUN-PM | 9 | 61 | 48 | -13 | 67 | 56 | -11 |
| | | D291 | SUN-VEM | 8 | 60 | 43 | -17 | 66 | 51 | -15 |
| | | D301 | SAT-VEM | 11 | 58 | 51 | -7 | 64 | 52 | -12 |
| | | D302 | VEM-PM | 16 | 58 | 61 | +3 | 64 | 64 | 0 |
| | | D305 | VEM-PM | 16 | 58 | 52 | -6 | 64 | 58 | -6 |
| | | D331 | VEM-PM | 8 | 55 | 37 | -18 | 61 | 44 | -17 |
| | | D332 | SAT-VEM | 8 | 58 | 51 | -7 | 64 | 59 | -5 |
| | | D333 | VEM-PM | 8 | 55 | 42 | -13 | 61 | 47 | -14 |
| | | D342 | SAT-EPM | 8 | 61 | 51 | -10 | 67 | 55 | -12 |
| | | DE351 | SUN-SUN | 11 | 70 | 63 | -7 | 76 | 71 | -5 |
| | | DT352 | SAT-EPM | 8 | 61 | 61 | 0 | 67 | 70 | +3 |
| 76 | PE | D281 | ESUN-PM | 9 | 61 | 58 | -3 | 67 | 64 | -3 |
| 77 | UG | D203 | EPM-SUN | 16 | 64 | 52 | -14 | 70 | 57 | -13 |
| | | D204 | VEM-SUN | 16 | 64 | 72 | +8 | 70 | 74 | +4 |
| | | DE353 | SUN-VEM | 16 | 63 | 55 | -8 | 69 | 65 | -4 |
| | | PD251 | VEM-SAT | 11 | 57 | 49 | -8 | 63 | 55 | -8 |
| 77 | PE | D203 | EPM-SUN | 16 | 64 | 66 | +2 | 70 | 70 | 0 |
| Single TX courses: | | | | | | | | | | |
| 77 | UG | D222 | SAT only | 8 | 49 | 30 | -19 | 55 | 33 | -22 |
| | | D301 | SAT only | 11 | 49 | 36 | -13 | 55 | 39 | -16 |
| | | D333 | SAT only | 8 | 49 | 42 | -7 | 55 | 50 | -5 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

EDUCATIONAL STUDIES FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R'_e$ | All students $R_o$ | All students dR | Non-dropouts $R'_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | E221 | SAT-VEM | 9 | 58 | 60 | +2 | - | - | - |
| | | E262 | SAT-EPM | 9 | 61 | 62 | +1 | - | - | - |
| | | E281 | SAT-EPM | 10 | 61 | 62 | +1 | - | - | - |
| | | E282 | SAT-EPM | 10 | 61 | 58 | -3 | - | - | - |
| | | E283 | SAT-EPM | 9 | 61 | 65 | +4 | - | - | - |
| | | E341 | SAT-VEM | 9 | 58 | 60 | +2 | - | - | - |
| | | E351 | SAT-EPM | 12 | 61 | 58 | -3 | - | - | - |
| | | E352 | SAT-VEM | 9 | 58 | 56 | -2 | - | - | - |
| 76 | UG | E201 | SAT-EPM | 17 | 64 | 61 | -3 | 70 | 66 | -4 |
| | | E203 | SAT-EPM | 17 | 64 | 60 | -4 | 70 | 64 | -6 |
| | | E321 | VEM-PM | 9 | 55 | 56 | +1 | 61 | 64 | +3 |
| | | E341 | SUN-VEM | 9 | 60 | 50 | -10 | 66 | 65 | -1 |
| | PE | E341 | SUN-VEM | 9 | 60 | 65 | +5 | 66 | 70 | +4 |
| | | PE261 | SAT-VEM | 13 | 58 | 62 | +4 | 64 | 67 | +3 |
| 77 | UG | E202 | SUN-VEM | 12 | 60 | 55 | -5 | 66 | 59 | -7 |
| | | ED322 | SUN-EM | 9 | 60 | 49 | -11 | 66 | 52 | -14 |
| | | PE231 | VEM-SUN | 8 | 61 | 48 | -13 | 67 | 56 | -11 |
| 77 | PE | E262 | EM-PM | 9 | 55 | 59 | +4 | 61 | 64 | +3 |
| | | PE231 | VEM-SUN | 8 | 61 | 61 | 0 | 67 | 66 | -1 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

MATHEMATICS FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students | | | Non-dropouts | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $R'_e$ | $R_o$ | dR | $R'_e$ | $R_o$ | dR |
| 74 | UG | M100 | PM-SUN | 39 | 68 | 63 | -5 | - | - | - |
| | | M201 | EPM-SUN | 35 | 64 | 58 | -6 | - | - | - |
| | | M202 | PM-ESAT | 35 | 60 | 55 | -5 | - | - | - |
| | | M231 | PM-SAT | 12 | 62 | 48 | -14 | - | - | - |
| | | M251 | PM-SAT | 12 | 62 | 53 | -9 | - | - | - |
| | | MDT241 | PM-SAT | 12 | 62 | 52 | -10 | - | - | - |
| | | MST281 | SUN-VEM | 18 | 63 | 53 | -10 | - | - | - |
| | | MST282 | VEM-SUN | 18 | 64 | 53 | -11 | - | - | - |
| | | M321 | EPM-SAT | 4 | 57 | 48 | -9 | - | - | - |
| 76 | UG | M100 | ESAT-PM | 38 | 62 | 62 | 0 | 68 | 66 | -2 |
| | | M331 | SUN-EPM | 8 | 63 | 55 | -8 | 69 | 64 | -5 |
| | | M332 | SUN-EPM | 11 | 63 | 56 | -7 | 69 | 65 | -4 |
| | | M351 | VEM-PM | 8 | 55 | 48 | -7 | 61 | 59 | -2 |
| 76 | PE | PM951 | SAT-EPM | 12 | 61 | 71 | +10 | 67 | 79 | +12 |
| 77 | UG | M341 | EM-SAT | 8 | 58 | 44 | -14 | 64 | 52 | -12 |
| 77 | PE | MDT241 | EM-EPM | 9 | 53 | 50 | -3 | 59 | 54 | -5 |
| Single TX courses: | | | | | | | | | | |
| 76 | UG | M202 | SAT only | 35 | 52 | 51 | -1 | 58 | 57 | -1 |
| 77 | UG | M201 | SAT only | 35 | 52 | 35 | -17 | 58 | 38 | -20 |
| | | M202 | SAT only | 35 | 52 | 47 | -5 | 58 | 47 | -11 |
| 77 | PE | PM951 | SUN only | 12 | 50 | 55 | +5 | 56 | 62 | +6 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

SCIENCE FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R'_e$ | All students $R_o$ | All students dR | Non-dropouts $R'_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | S100 | SAT-PM | 38 | 67 | 77 | +10 | - | - | - |
| | | S22- | PM-VEM | 12 | 53 | 70 | +17 | - | - | - |
| | | S23- | SAT-PM | 12 | 64 | 75 | +11 | - | - | - |
| | | S24- | SUN-EPM | 12 | 63 | 76 | +13 | - | - | - |
| | | S25- | SUN-EPM | 12 | 63 | 75 | +12 | - | - | - |
| | | S26- | SUN-PM | 12 | 65 | 71 | +6 | - | - | - |
| | | SDT286 | PM-VEM | 18 | 56 | 66 | +10 | - | - | - |
| | | S321 | SUN-VEM | 17 | 63 | 76 | +13 | - | - | - |
| | | S323 | VEM-SUN | 16 | 64 | 77 | +13 | - | - | - |
| | | SM351 | VEM-PM | 11 | 55 | 70 | +15 | - | - | - |
| | | ST285 | VEM-SUN | 17 | 64 | 66 | +2 | - | - | - |
| 76 | UG | S100 | SUN-PM | 38 | 67 | 77 | +10 | 73 | 83 | +10 |
| | | S266 | SAT-EPM | 12 | 61 | 68 | +7 | 67 | 73 | +6 |
| | | S299 | VEM-PM | 16 | 58 | 65 | +7 | 64 | 74 | +10 |
| | | S321 | EM-SAT | 16 | 61 | 66 | +5 | 67 | 70 | +3 |
| | | S323 | EM-SAT | 16 | 61 | 64 | +3 | 67 | 69 | +2 |
| | | S333 | SUN-EPM | 16 | 66 | 70 | +4 | 72 | 77 | +5 |
| | | S351 | VEM-PM | 16 | 58 | 71 | +3 | 64 | 79 | +15 |
| | | SDT286 | SAT-EM | 17 | 62 | 60 | -2 | 68 | 71 | +3 |
| | | ST285 | SAT-VEM | 17 | 61 | 57 | -4 | 67 | 70 | +3 |
| | | ST294 | SAT-VEM | 16 | 61 | 63 | +2 | 67 | 66 | -1 |
| 76 | PE | SDT286 | SAT-EM | 17 | 62 | 66 | +4 | 68 | 75 | +7 |
| 77 | UG | S322 | VEM-SAT | 16 | 60 | 60 | 0 | 66 | 66 | 0 |
| | | S352 | VEM-SAT | 16 | 60 | 68 | +8 | 66 | 69 | +3 |
| | | ST291 | EM-SAT | 18 | 61 | 55 | -6 | 67 | 70 | +3 |
| 77 | PE | S266 | SAT-EPM | 12 | 61 | 66 | +5 | 67 | 73 | +6 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

TECHNOLOGY FACULTY: Summary of course data related to expected and observed TV viewing rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R'_e$ | All students $R_o$ | All students dR | Non-dropouts $R'_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | T100 | SUN-PM | 35 | 68 | 64 | -4 | - | - | - |
| | | T241 | SAT-PM | 16 | 67 | 59 | -8 | - | - | - |
| | | T242 | VEM-PM | 11 | 55 | 56 | +1 | - | - | - |
| | | T291 | VEM-PM | 11 | 55 | 72 | +17 | - | - | - |
| | | TS251 | VEM-SUN | 16 | 64 | 78 | +14 | - | - | - |
| | | TS282 | SAT-PM | 17 | 67 | 62 | -5 | - | - | - |
| 76 | UG | T231 | SUN-EM | 16 | 63 | 58 | -5 | 69 | 71 | +2 |
| | | T241 | SUN-EM | 16 | 63 | 55 | -8 | 69 | 58 | -11 |
| | | T242 | SUN-VEM | 11 | 60 | 52 | -8 | 66 | 56 | -10 |
| | | T262 | SUN-VEM | 11 | 60 | 67 | +7 | 66 | 69 | +3 |
| | | T321 | SAT-EM | 16 | 62 | 62 | 0 | 68 | 69 | +1 |
| | | T341 | VEM-PM | 8 | 55 | 53 | -2 | 61 | 64 | +3 |
| | | T351 | SAT-EM | 16 | 62 | 63 | +1 | 68 | 70 | +2 |
| | | TAD292 | PM-EM | 16 | 57 | 48 | -9 | 63 | 51 | -12 |
| | | TD342 | SUN-EPM | 16 | 66 | 66 | 0 | 72 | 76 | +4 |
| | | TM221 | PM-EM | 11 | 54 | 47 | -7 | 60 | 52 | -8 |
| | | TS282 | VEM-PM | 17 | 58 | 53 | -5 | 64 | 59 | -5 |
| 76 | PE | T241 | SUN-EM | 16 | 63 | 71 | +8 | 69 | 75 | +6 |
| | | T242 | SUN-VEM | 11 | 60 | 67 | +7 | 66 | 69 | +3 |
| | | TS282 | VEM-PM | 17 | 58 | 66 | +8 | 64 | 74 | +10 |
| | | PET271 | SUN-EPM | 11 | 63 | 78 | +15 | 69 | 80 | +11 |
| | | PT272 | SUN-EPM | 8 | 63 | 74 | +11 | 69 | 77 | +8 |
| 77 | UG | TM281 | VEM-SUN | 11 | 61 | 51 | -10 | 67 | 54 | -13 |
| 77 | PE | T262 | SAT-EPM | 11 | 61 | 61 | 0 | 67 | 76 | +9 |
| | | T321 | EM-SUN | 16 | 65 | 70 | +5 | 71 | 77 | +6 |

Note: $R'_e$ = expected rate (based on TX-comb. and no. of progs).

$R_o$ = observed rate

dR = residual rate ($R_o - R'_e$)

ARTS FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R_e$ | All students $R_o$ | All students dR | Non-dropouts $R_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | A100 | PM-SUN | 36 | 48 | 50 | +2 | - | - | - |
| | | A201 | PM-ESUN | 35 | 38 | 45 | +7 | - | - | - |
| | | A202 | PM-SAT | 34 | 43 | 46 | +3 | - | - | - |
| | | A291 | PM-SAT | 16 | 43 | 41 | -2 | - | - | - |
| | | AMST283 | VEM-SUN | 11 | 42 | 41 | -1 | - | - | - |
| | | AST281 | VEM-SUN | 11 | 42 | 43 | +1 | - | - | - |
| | | A301 | PM-SAT | 16 | 43 | 44 | +1 | - | - | - |
| | | A302 | PM-SAT | 16 | 43 | 47 | +4 | - | - | - |
| | | A303 | VEM-SUN | 16 | 42 | 38 | -4 | - | - | - |
| | | A304 | VEM-SUN | 16 | 42 | 50 | +8 | - | - | - |
| | | A401 | PM-SAT | 16 | 43 | 40 | -3 | - | - | - |
| 76 | UG | A291 | PM---- | 16 | 32 | 43 | +11 | 37 | 50 | +13 |
| | | A301 | PM---- | 16 | 32 | 36 | +4 | 37 | 36 | -1 |
| | | A302 | PM---- | 16 | 32 | 47 | +15 | 37 | 49 | +12 |
| | | A303 | PM---- | 16 | 32 | 34 | +2 | 37 | 39 | +2 |
| | | A304 | PM---- | 16 | 32 | 47 | +15 | 37 | 53 | +16 |
| | | A305 | SAT-LSUN | 32 | 37 | 53 | +16 | 42 | 58 | +16 |
| | | A306 | SAT-LSUN | 16 | 37 | 49 | +12 | 42 | 53 | +11 |
| | | A321 | ESAT-ESUN | 16 | 34 | 42 | +8 | 39 | 47 | +8 |
| | | A351 | SAT-LSUN | 16 | 37 | 49 | +12 | 42 | 56 | +14 |
| | | A401 | PM---- | 16 | 32 | 30 | -2 | 37 | 33 | -4 |
| | | A402 | ESAT-PM | 16 | 43 | 41 | -2 | 48 | 44 | -4 |
| | | AM289 | SAT-VEM | 11 | 36 | 32 | -4 | 41 | 35 | -6 |
| 76 | PE | A301 | PM---- | 16 | 32 | 35 | +3 | 37 | 37 | 0 |
| | | PA981 | SAT-LSUN | 8 | 37 | 53 | +16 | 42 | 61 | +19 |
| 77 | UG | A241 | ESUN-PM | 16 | 39 | 64 | +25 | 44 | 73 | +29 |
| | | A307 | ESAT-PM | 20 | 43 | 42 | -1 | 48 | 42 | -6 |
| | | A322 | ESUN-PM | 8 | 39 | 41 | +2 | 44 | 45 | +1 |
| | | A303 | PM---- | 11 | 32 | 38 | +6 | 37 | 40 | +3 |
| | | A401 | PM---- | 11 | 32 | 38 | +6 | 37 | 41 | +4 |
| 77 | PE | AM289 | VEM-SAT | 11 | 36 | 41 | +5 | 41 | 48 | +7 |
| | | AMST283 | VEM-SAT | 11 | 36 | 52 | +16 | 41 | 60 | +19 |

Note: $R_e$ = expected rate (based on TX combination)
$R_o$ = observed rate
dR = residual rate ($R_o - R_e$)

SOCIAL SCIENCES FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R_e$ | All students $R_o$ | All students dR | Non-dropouts $R_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | D100 | PM-SAT | 34 | 43 | 49 | +6 | - | - | - |
| | | D203 | PM-ESAT | 34 | 41 | 42 | +1 | - | - | - |
| | | D222 | PM-SAT | 16 | 43 | 37 | -6 | - | - | - |
| | | D231 | PM-SAT | 8 | 43 | 47 | +4 | - | - | - |
| | | D281 | VEM-SUN | 17 | 42 | 42 | 0 | - | - | - |
| | | D282 | PM-SAT | 17 | 43 | 36 | -7 | - | - | - |
| | | D283 | PM-SAT | 17 | 43 | 37 | -6 | - | - | - |
| | | DS261 | VEM-SUN | 16 | 42 | 42 | 0 | - | - | - |
| | | DT201 | PM-SAT | 32 | 43 | 44 | +1 | - | - | - |
| | | D301 | VEM-SUN | 11 | 42 | 48 | +6 | - | - | - |
| | | D331 | PM-SAT | 16 | 43 | 44 | +1 | - | - | - |
| | | D342 | PM-ESUN | 11 | 38 | 33 | -5 | - | - | - |
| | | DT352 | PM-SAT | 8 | 43 | 53 | +10 | - | - | - |
| 76 | UG | D101 | SAT-PM | 31 | 45 | 43 | -2 | 50 | 46 | -4 |
| | | D281 | PM-VEM | 17 | 37 | 34 | -3 | 42 | 41 | -1 |
| | | D291 | ESUN-PM | 16 | 39 | 27 | -12 | 44 | 33 | -11 |
| | | D301 | SUN---- | 11 | 39 | 39 | 0 | 44 | 40 | -4 |
| | | D302 | ESAT-PM | 32 | 43 | 44 | +1 | 48 | 48 | 0 |
| | | D305 | SAT-VEM | 16 | 36 | 37 | +1 | 41 | 41 | 0 |
| | | D331 | SUN---- | 16 | 39 | 32 | -7 | 44 | 42 | -2 |
| | | D332 | ESAT-ESUN | 16 | 34 | 34 | 0 | 39 | 43 | +4 |
| | | D333 | SAT-VEM | 8 | 36 | 34 | -2 | 41 | 38 | -3 |
| | | D342 | SUN---- | 11 | 39 | 33 | -6 | 44 | 36 | -8 |
| | | DE351 | SAT-VEM | 16 | 36 | 36 | 0 | 41 | 41 | 0 |
| | | DT352 | SUN---- | 8 | 39 | 41 | +2 | 44 | 50 | +6 |
| 76 | PE | D281 | PM-VEM | 17 | 37 | 46 | +9 | 42 | 52 | +10 |
| 77 | UG | D203 | PM-SAT | 32 | 43 | 47 | +4 | 48 | 53 | +5 |
| | | D204 | SAT-PM | 11 | 45 | 59 | +14 | 50 | 61 | +11 |
| | | DE353 | ESUN-PM | 16 | 39 | 40 | +1 | 44 | 45 | +1 |
| | | PD251 | VEM-SAT | 11 | 36 | 39 | +3 | 41 | 44 | +3 |
| | | D222 | PM---- | 8 | 32 | 31 | -1 | 37 | 36 | -1 |
| | | D301 | PM---- | 11 | 32 | 41 | +9 | 37 | 44 | +7 |
| | | D333 | VEM-SAT | 8 | 36 | 36 | 0 | 41 | 40 | -1 |
| 77 | PE | D203 | PM-SAT | 32 | 43 | 59 | +16 | 48 | 63 | +15 |

Note: $R_e$ = expected rate (based on TX combination)

$R_o$ = observed rate

dR = residual rate $(R_o - R_e)$

EDUCATIONAL STUDIES FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students | | | Non-dropouts | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $R_e$ | $R_o$ | dR | $R_e$ | $R_o$ | dR |
| 74 | UG | E221 | PM-SAT | 16 | 43 | 41 | -2 | - | - | - |
| | | E262 | PM-SAT | 16 | 43 | 42 | -1 | - | - | - |
| | | E281 | PM-ESUN | 17 | 38 | 41 | +3 | - | - | - |
| | | E282 | PM-SAT | 17 | 43 | 38 | -5 | - | - | - |
| | | E283 | PM-ESUN | 17 | 38 | 36 | -2 | - | - | - |
| | | E341 | PM-SAT | 11 | 43 | 45 | +2 | - | - | - |
| | | E351 | PM-SAT | 12 | 43 | 47 | +4 | - | - | - |
| | | E352 | PM-SAT | 12 | 43 | 45 | +2 | - | - | - |
| 76 | UG | E201 | ESUN-PM | 32 | 39 | 40 | +1 | 44 | 45 | +1 |
| | | E203 | SAT-VEM | 24 | 36 | 37 | +1 | 41 | 41 | 0 |
| | | E321 | ESAT-PM | 11 | 43 | 40 | -3 | 48 | 47 | -1 |
| | | E341 | PM-VEM | 11 | 37 | 36 | -1 | 41 | 42 | -1 |
| | | PE261 | SAT-VEM | 8 | 36 | 35 | -1 | 41 | 42 | +1 |
| | | PET271 | ESUN-PM | 11 | 39 | 26 | -13 | 44 | 29 | -15 |
| 76 | PE | E341 | PM-VEM | 11 | 37 | 48 | +11 | 42 | 53 | +11 |
| | | PE261 | SAT-VEM | 8 | 36 | 46 | +10 | 41 | 51 | +10 |
| | | PET271 | ESUN-VEM | 11 | 39 | 50 | +11 | 44 | 52 | +8 |
| 77 | UG | E202 | ESAT-PM | 16 | 43 | 42 | -1 | 48 | 45 | -3 |
| | | ED322 | ESAT-PM | 8 | 43 | 43 | 0 | 48 | 46 | -2 |
| | | PE231 | SAT-PM | 8 | 45 | 42 | -3 | 50 | 51 | -1 |
| 77 | PE | E262 | SAT-PM | 16 | 45 | 52 | +7 | 50 | 57 | +7 |
| | | PE231 | SAT-PM | 8 | 45 | 47 | +2 | 50 | 53 | +3 |

Note: $R_e$ = expected rate (based on TX combination)

$R_o$ = observed rate

dR = residual rate ($R_o - R_e$)

MATHEMATICS FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students | | | Non-dropouts | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | $R_e$ | $R_o$ | dR | $R_e$ | $R_o$ | dR |
| 74 | UG | M100 | PM-SAT | 35 | 43 | 30 | -13 | - | - | - |
| | | M201 | PM-SAT | 17 | 43 | 27 | -16 | - | - | - |
| | | M202 | PM-SAT | 16 | 43 | 30 | -13 | - | - | - |
| | | M231 | ESAT-PM | 8 | 43 | 37 | -6 | - | - | - |
| | | M251 | ESAT-PM | 8 | 43 | 30 | -13 | - | - | - |
| | | MDT241 | PM-ESUN | 8 | 38 | 36 | -2 | - | - | - |
| | | MST281 | PM-ESAT | 9 | 41 | 33 | -8 | - | - | - |
| | | MST282 | PM-ESAT | 9 | 41 | 29 | -12 | - | - | - |
| | | M321 | PM-ESUN | 8 | 38 | 26 | -12 | - | - | - |
| 76 | UG | M100 | SAT-PM | 35 | 45 | 31 | -14 | 50 | 35 | -15 |
| | | M202 | PM-VEM | 16 | 37 | 27 | -10 | 42 | 28 | -14 |
| | | M331 | SUN---- | 8 | 39 | 34 | -5 | 44 | 42 | -2 |
| | | M332 | SUN---- | 8 | 39 | 35 | -4 | 44 | 38 | -6 |
| | | M351 | SUN---- | 8 | 39 | 27 | -12 | 44 | 36 | -8 |
| 76 | PE | PM951 | SUN---- | 12 | 39 | 59 | +20 | 44 | 67 | +23 |
| 77 | UG | M341 | VEM-PM | 8 | 40 | 29 | -11 | 45 | 36 | -9 |
| | | M201 | PM---- | 35 | 32 | 19 | -13 | 37 | 21 | -16 |
| | | M202 | PM---- | 35 | 32 | 20 | -12 | 37 | 20 | -17 |
| 77 | PE | MDT241 | PM---- | 8 | 32 | 16 | -16 | 37 | 16 | -21 |
| | | PM951 | VEM-PM | 12 | 40 | 51 | +11 | 45 | 59 | +14 |

Note: $R_e$ = expected rate (based on TX combination)
$R_o$ = observed rate
dR = residual rate ($R_o - R_e$)

SCIENCE FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX.comb. | No. prg. | All students $R_e$ | All students $R_o$ | All students dR | Non-dropouts $R_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | S100 | PM-SAT | 37 | 43 | 44 | +1 | - | - | - |
| | | S22- | PM-SAT | 13 | 43 | 31 | -12 | - | - | - |
| | | S23- | PM-SAT | 3 | 43 | 50 | +7 | - | - | - |
| | | S24- | PM-SAT | 3 | 43 | 47 | +4 | - | - | - |
| | | S25- | PM-SAT | 4 | 43 | 47 | +4 | - | - | - |
| | | S26- | PM-SAT | 4 | 43 | 46 | +3 | - | - | - |
| | | SDT286 | PM-SAT | 13 | 43 | 34 | -9 | - | - | - |
| | | ST285 | PM-SAT | 5 | 43 | 36 | -7 | - | - | - |
| | | S321 | PM-SAT | 8 | 43 | 45 | +2 | - | - | - |
| | | S323 | PM-SAT | 8 | 43 | 39 | -4 | - | - | - |
| | | SM351 | PM-SAT | 8 | 43 | 42 | -1 | - | - | - |
| 76 | UG | S100 | SAT-PM | 37 | 45 | 39 | -6 | 50 | 42 | -8 |
| | | S299 | VEM-PM | 16 | 40 | 39 | -1 | 45 | 47 | +2 |
| | | S321 | PM---- | 8 | 32 | 37 | +5 | 37 | 40 | +3 |
| | | S323 | PM---- | 8 | 32 | 34 | +2 | 37 | 36 | -1 |
| | | S333 | ESAT-PM | 11 | 43 | 50 | +7 | 48 | 56 | +8 |
| | | S351 | VEM-PM | 8 | 40 | 40 | 0 | 45 | 45 | 0 |
| | | SDT286 | VEM-PM | 13 | 40 | 26 | -14 | 45 | 30 | -15 |
| | | ST285 | PM---- | 5 | 32 | 31 | -1 | 37 | 37 | 0 |
| | | ST294 | PM---- | 5 | 32 | 32 | 0 | 37 | 32 | -5 |
| 76 | PE | SDT286 | VEM-PM | 13 | 40 | 28 | -12 | 45 | 32 | -13 |
| 77 | UG | S322 | VEM-PM | 16 | 40 | 31 | -9 | 45 | 34 | -11 |
| | | S352 | ESUN-PM | 8 | 39 | 31 | -8 | 44 | 31 | -13 |
| | | ST291 | VEM-PM | 8 | 40 | 37 | -3 | 45 | 45 | 0 |
| 77 | PE | S266 | PM---- | 12 | 32 | 43 | +11 | 37 | 50 | +13 |

Note: $R_e$ = expected rate (based on TX combination)

$R_o$ = observed rate

dR = residual rate ($R_o - R_e$)

TECHNOLOGY FACULTY: Summary of course data related to expected and observed radio listening rates

| Yr | Stud. cat. | Course | TX-comb. | No. prg. | All students $R_e$ | All students $R_o$ | All students dR | Non-dropouts $R_e$ | Non-dropouts $R_o$ | Non-dropouts dR |
|---|---|---|---|---|---|---|---|---|---|---|
| 74 | UG | T100 | PM-SAT | 35 | 43 | 41 | -2 | - | - | - |
| | | T241 | PM-ESAT | 8 | 41 | 37 | -4 | - | - | - |
| | | T242 | PM-ESUN | 8 | 38 | 35 | -3 | - | - | - |
| | | T291 | PM-ESAT | 8 | 41 | 45 | +4 | - | - | - |
| | | TS251 | PM-ESAT | 8 | 41 | 39 | -2 | - | - | - |
| | | TS282 | PM-ESAT | 5 | 41 | 43 | +2 | - | - | - |
| 76 | UG | T231 | ESUN-PM | 8 | 39 | 33 | -6 | 44 | 42 | -2 |
| | | T241 | ESAT-PM | 8 | 43 | 36 | -7 | 48 | 38 | -10 |
| | | T242 | SUN---- | 8 | 39 | 33 | -6 | 44 | 36 | -8 |
| | | T262 | SUN---- | 8 | 39 | 46 | +7 | 44 | 50 | +6 |
| | | T321 | SAT-PM | 8 | 45 | 38 | -7 | 50 | 42 | -8 |
| | | T341 | SUN---- | 8 | 39 | 38 | -1 | 44 | 48 | +4 |
| | | T351 | SUN---- | 8 | 39 | 32 | -7 | 44 | 43 | -1 |
| | | TAD292 | ESUN-PM | 16 | 39 | 35 | -4 | 44 | 38 | -6 |
| | | TD342 | SUN---- | 8 | 39 | 48 | +9 | 44 | 57 | +13 |
| | | TM221 | ESUN-PM | 16 | 39 | 25 | -14 | 44 | 29 | -15 |
| | | TS282 | ESUN-PM | 5 | 39 | 30 | -9 | 44 | 35 | -9 |
| | | PT272 | ESUN-PM | 16 | 39 | 39 | 0 | 44 | 42 | -2 |
| 76 | PE | T241 | ESAT-PM | 8 | 43 | 48 | +5 | 48 | 51 | +3 |
| | | T242 | SUN---- | 8 | 39 | 47 | +8 | 44 | 47 | +3 |
| | | TS282 | ESUN-PM | 5 | 39 | 45 | +6 | 44 | 49 | +5 |
| | | PT272 | ESUN-PM | 16 | 39 | 55 | +16 | 44 | 58 | +14 |
| 77 | PE | T262 | ESUN-SUN | 11 | 41 | 53 | +12 | 46 | 68 | +22 |
| | | T321 | VEM-PM | 16 | 40 | 49 | +9 | 45 | 52 | +7 |

Note: $R_e$ = expected rate (based on TX combination)

$R_o$ = observed rate

dR = residual rate ($R_o - R_e$)

## A note on analysis of variance (ANOVA)

Standard methods for calculating 'between groups' variance components (for main factors and their interactions) in ANOVA designs with two or more main factors presupposes that the number of observations (n) is constant from cell to cell, or at least that each cell within a row (or column) contains a constant proportion of the total number of observations in that row (or column). For example, if the main factors in a design are experimental group and sex, it is not necessary to have the same number of men as of women, but the proportion of men should be the same in both experimental groups. In other words, ANOVA with two or more main factors presupposes proportionality of a certain kind in the matrix of n-values.

Experiments can usually be planned so that this proportionality of n-value is guaranteed, but when ANOVA is performed on data of the kind obtained in the OU broadcast surveys, this proportionality is seldom achieved. In order to make the best possible use of available data, it is desirable, in this case, to carry out ANOVA on data sets which do not show this proportionality of n-values. For example, for the purpose of comparing listening rate for first transmission during a given time slot with that for single transmission during the same time slot, we can make use of 59 observations from 4 faculties, distributed as follows:

| | Faculty | | | | |
|---|---|---|---|---|---|
| | A | D | M | S | Sum |
| First TX PM | 7 | 14 | 8 | 11 | 40 |
| Single TX PM | 9 | 2 | 3 | 5 | 19 |
| Sum | 16 | 16 | 11 | 16 | 59 |

If an ANOVA is carried out on a data set with these cell frequencies, differences between faculties (A, D, M and S) in listening rate will affect the observed difference between courses with PM time as first TX and those with PM time as single TX. (Nearly half the single TX courses observed are from the Arts faculty, with normally high listening rates, whereas less than 20 per cent of the first TX observations are from the Arts faculty).

One way of analyzing data of this kind is to treat them as if the n-values for all cells were equal. This can be achieved simply through calculating sums of squares for main factors (TX and Faculties) and interaction (TX by faculties) from cell means, rather than from cell sums, and comparing these sums of squares to an adjusted within-cells variance. The method is described in Walker & Lev (1953). The disadvantage with this method is that it results in treating all row frequencies as equal and all column frequencies as equal, something which effects the row and column means that determine the sums of squares between groups.

In order to obtain proportionality of cell frequencies without eliminating differences in row frequency sums and in column frequency sums, a modified version of the method described by Walker & Lev has been used in this study. This modified method involves the following steps:

(1) Sum of squares within cells is calculated in the usual way as sum of squared deviations from cell means, summed over all observations.

(2) Adjusted n-values (n') are calculated according to the formula.

$$n'_{ij} = \sum_{i=1}^{r} n_{i.} \sum_{j=1}^{c} n_{.j} \Big/ \sum_{i=1}^{r} \sum_{j=1}^{c} n_{ij} \quad ;$$

where r is numbers of rows, c number of columns and $n_{ij}$ number of observations in row i, column j. These adjusted n-values (n') satisfy the demand for proportionality presupposed in 'multi-dimensional' ANOVA.

(3) Using the n' - values obtained in step 2, adjusted cell sums are calculated according to the formula

$$\sum X'_{ij} = \sum X_{ij} \cdot n'_{ij}/n_{ij} \; ; \quad \text{where } \sum X_{ij} \text{ is the observed sum for cell ij.}$$

These adjusted cell sums represent the estimates of what the cell sums would have been, had there been proportionality in the original n-values for the various cells.

(4) Sums of squares for main factors and for their interaction are calculated on the basis of the adjusted n-values and cell sums obtain ed in steps 2 and 3.